WO0225420

Publication Title:

METHOD, SYSTEM AND COMPUTER PROGRAM FOR MANAGING VIEWS
AT A COMPUTER DISPLAY

Abstract:

A views management system has a computer display (14) which provides a
hideable view bar having pane splitting controls (42,46,48) and a list of open
views (44). Through selection of specific ones of the pane splitting controls
(42,46,48), a system user can configure the display (14) to show any number and
arrangement of tiled views. By simply selecting one of the open views in the list
(44) appearing in the view bar, the user can assign that view to the pane
currently having focus. The contents of pairs of panes can easily be swapped by
a click-drag-drop operation sequence using a cursor- controlling pointing device
(32).

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification[7]: **G06F 3/033**

(21) International Application Number: PCT/GB01/03564

(22) International Filing Date: 8 August 2001 (08.08.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/665,193   18 September 2000 (18.09.2000)   US

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *entirely in electronic form (except for this front page) and available upon request from the International Bureau*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD, SYSTEM AND COMPUTER PROGRAM FOR MANAGING VIEWS AT A COMPUTER DISPLAY

(57) Abstract: A views management system has a computer display (14) which provides a hideable view bar having pane splitting controls (42,46,48) and a list of open views (44). Through selection of specific ones of the pane splitting controls (42,46,48), a system user can configure the display (14) to show any number and arrangement of tiled views. By simply selecting one of the open views in the list (44) appearing in the view bar, the user can assign that view to the pane currently having focus. The contents of pairs of panes can easily be swapped by a click-drag-drop operation sequence using a cursor-controlling pointing device (32).

METHOD, SYSTEM AND COMPUTER PROGRAM
FOR MANAGING VIEWS AT A COMPUTER DISPLAY

5   Field of the Invention

The present invention relates to computer systems and more
particularly to a method, system and program product for managing views at
a computer system display.

10

Background of the Invention

At one time computer systems, whether standalone or part of a
network, were relatively simple, low function devices capable of executing
15   only a single application program at any given time. Displays or consoles
used to monitor system operation gave a user only a single representation
or view of the system operation. As individual systems and networks
became more complex, allowing multiple tasks to be performed concurrently,
system users began to have a need for more than a single view of
20   operations or tasks being performed. The straightforward approach of
dedicating a console to each of the different views had obvious usability,
space and cost drawbacks. Consequently, the almost universal approach has
been to develop systems and monitors capable of presenting multiple views
at any given time.

25

The two major approaches to presenting multiple views on a console
are cascading and tiling of windows or panes. For purposes of this
description, the two terms "windows" and "panes" can be considered to mean
the same thing, namely, a view that occupies less than an entire display
30   screen but which still shows significant portions of a particular view.
Where panes are cascading, only the topmost pane is completely visible on
the display screen. The remaining panes are "stacked" beneath the topmost
pane, usually with only a title bar and perhaps one vertical edge being
visible. A user brings any pane in the stack to the top simply by
35   selecting the title bar or any other visible part of that pane.

Tiled views do not overlap each other but instead occupy
horizontally or vertically divided panes on the display screen. Tiling
permits a user to see more information about each represented view without
40   having to perform the type of view selection steps required for cascaded
views.

Known tiling techniques have disadvantages, including a lack of flexibility. Some techniques limit the user to simple, fixed tiling arrangements, such as two side-by-side panes or two above-and-below panes. A user who wants to have a number of views greater than the fixed number of panes available in such systems is out of luck. Other techniques take an all-or-nothing approach, setting up a tile for every open view. The all-or-nothing approach is satisfactory only if the number of open views is small. As the number of open views increases, the size of each tile necessarily gets smaller, reducing the amount of useful information presented to the user.

U.S. Patent 5,880,725 - Southgate attempts to overcome some of the problems of the prior art in a computer user interface in which a screen can have both overlapping and tiled window areas. If a view is to be shown in a tiled window area, that view is fitted into the available space by shrinking the view, if necessary, to a minimum allowable size. The patent discloses what can be described as a "best fit" approach in which a view is moved into available screen space. While this approach may be more flexible in creating a displayed views, it can also end up with panes that are considerably smaller than those required by a system user.

One well-known operating system enables a user to subdivide the display screen into a wide variety of horizontally or vertically divided frames. While this operating system is flexible in that it allows the user to define the total number and configuration of frames needed, it is considerably less flexible as to the steps that must be performed in loading data into the various frames. To load the contents of a particular file into a particular panel, a link to the file must be established and the filename must be keyed in. This relatively cumbersome process must be repeated for every single frame in the display.

Another known system uses a fixed number of panes but allows a user to change the arrangement of the panes relative to one another using a drag-and-drop operation. Because the number of panes is fixed, the system lacks desirability flexibility.

Summary of the Invention

Accordingly, according to a first aspect, the present invention provides a method of managing the appearance of views on a display having a working area that includes at least one view pane, said method comprising the steps of: a) designating one of the view panes in the

working area as a focus view pane; b) invoking a view bar including a set
of pane splitting controls and a list of open views; c) in response to
selection of one of the pane splitting controls, dividing the focus view
pane into two panes, the contents of the focus view pane being assigned to
5   a first of the two panes; and d) in response to selection of one of the
open views from the list appearing in the view bar, assigning the selected
view to a second of the two panes.

Accordingly, according to a second aspect, the present invention
10 provides a system for managing the representation of views comprising:
a) a display having a working area including at least one view pane
designated as a focus view pane;
b) a display control subsystem for generating a view bar having pane
splitting controls and a list of open views;
15 c) pane control logic responsive to selection of one of the pane splitting
controls for dividing the focus view pane into two panes in accordance
with the selected pane splitting control and for assigning the contents of
the focus view pane to a first of the two panes; and
d) view control logic responsive to selection of one of the views on the
20 list of open views for assigning the selected view to the second of the
two panes.

Accordingly, according to a third aspect, the present invention
provides a computer program which, when executed on a computer, causes the
25 computer to:
a) designate a view pane in a working area of a computer display as a
focus view pane;
b) invoke a view bar on the computer display, said view bar including a
set of pane splitting controls and a list of open views;
30 c) in response to selection of one of the pane splitting controls, divide
the focus view pane into two panes, the contents of the focus view pane
being assigned to a first of the two panes; and
d) in response to selection of an open view from the list appearing in the
view bar, assign the selected view to a second of the two panes.
35

Thus, the present invention overcomes the enumerated disadvantages
of the prior art and can be implemented as a method of managing the
appearance of views on the display having a working area that includes at
least one view pane. The display always includes at least one view pane
40 designated as an active or focus view pane. A user who wants to increase
the number of views on the display invokes a view bar which includes a set
of pane-splitting controls and a list of open views. In response to

selection of one of the pane-splitting controls, the view pane having focus is divided into two panes and the contents of the focus view pane are assigned to a first of the two panes. The user controls the contents of the other view pane by selecting one of the open views from the list appearing in the view bar. The selected view is assigned to the other of the view panes.

Brief Description of the Drawings

A preferred embodiment of the present invention, by way of example only, may be more readily ascertained from the following detailed description when read in conjunction with the accompanying drawings wherein:

Figure 1 is a schematic representation of a workstation or computer system console at which the present invention may be implemented;

Figure 2 is a block diagram of the major components of the computer system console;

Figure 3 is an initial or default appearance of the working area of the display of the computer system console;

Figure 4 is a representation of the working area when a view bar normally hidden along the right edge of the area is unhidden or brought into view.;

Figure 5 is a representation of the working area once pane-splitting controls and a desired view are selected;

Figure 6 is a representation of the working area following the completion of pane-splitting and view selection;

Figure 7 is a view of the working area used to illustrate how views can be swapped efficiently among existing panes;

Figure 8 is a view of the working area following a view swapping operation;

Figure 9 is a flowchart of the method steps that are performed in setting up a new viewing pane and assigning views to the original and the new pane; and

Figure 10 is a flowchart of the method steps that are performed in carrying out a view swapping operation.

Detailed Description of the Preferred Embodiment

5   A preferred embodiment of the invention will be described below, but it should be kept in mind that the present invention can be implemented in several different forms, such as in special purpose hardware or in a combination of hardware and software. A typical combination of hardware and software is a general-purpose computer system using a computer program

10   that, once loaded and executed, causes the system to carry out method steps which will be described below. The software may be pre-loaded into the general-purpose computer system or may be separately available as a computer program product which, when loaded into a computer system, causes

15   the system to carry out the method steps.

The term "computer program" in the present context means any expression, in any language, code, or notation, of a set of instructions intended to cause a system having information processing capability to

20   perform a particular function either directly or after conversion to another language and/or reproduction in a different material form.

Referring to Figure 1, the present invention is a method for managing views in a computer system 10 including a system unit 12 and a

25   monitor or display 14. A computer user may configure panes for showing individual views in the working area 16 of the display 14, assign those views to the desired panes and swap those views in a series of simple, intuitive operations.

30   Figure 2 illustrates the major physical components of a general-purpose computer system capable, when programmed properly, of implementing the present invention. The computer system includes a central processing unit (CPU) subsystem 20 with a processor and supporting registers, caches and logic circuits. The computer system further

35   includes random access memory 22, hard drive 24 and an optical drive 26, such as a CD-R, CD-RW or DVD drive. Where the invention is implemented as a computer program, it is typically made available to the system operator initially on removable magnetic or optical media for installation onto hard drive 24. Once the initial installation is complete, the program can

40   be transferred, as needed, from hard drive 24 into random access memory 22. Alternatively, the program may be loaded into random access memory 22, as needed, directly from an optical media mounted in optical drive

26. The computer system further includes system input/output (I/O)
adapters 28 supporting connections to standard system components such as a
keyboard 30, a pointing device 32 and a video display 34. Finally, the
computer system may include a network interface card 36 which provides an
interface to other networked devices.

The preferred embodiment of the present invention will be described
first by reference to the changes in the display appearance in the course
of use of the invention and then by reference to flowcharts describing the
method steps which are performed in making those changes. Referring first
to Figure 3, the initial or default appearance of the display includes a
single view (VIEW 1) occupying the entire working area of the display. In
the default appearance, a view bar, which will be described in more detail
below, is considered to be hidden along the right edge of the display.
When hidden, the view bar is represented by a thin strip of pels 38, which
may include glyphs or icons representing the views.

The user changes the appearance of the display's working area by
invoking or calling up the view bar, preferably by moving a cursor over
the strip 38. In one implementation of the invention, the view bar
automatically expands or is unhidden once the presence of the cursor above
strip 38 is detected. In another implementation, the view bar remains
hidden until the user performs a selection operation, such as clicking one
of the buttons on the cursor control device, usually a mouse.

Figure 4 shows the working area once the view bar is unhidden using
one of the above-described methods. The view bar includes pane-splitting
controls, specifically a first pair of buttons 46 for dividing one view
pane already in the working area into two vertically spaced panes and a
second pair of buttons 42 for dividing one view pane already in the
working area into two horizontally spaced panes. The pane-splitting
controls are effective only for the active pane, sometimes referred to as
the pane having focus or the focus pane or focus view pane. In the case
of Figure 4, VIEW 1 is the only pane and by default is the focus view
pane.

The pane-splitting controls determine more than whether the focus
view pane is to be divided horizontally or vertically. Depending on
which of the two buttons in a set is pushed, the controls determine
whether the newly created pane is located to the right or to the left (or
above or below) the existing pane. Referring specifically to Figure 4, it
can be seen that the right facing triangle in the horizontal

pane-splitting control 42 is selected. As a result of this selection, a second view pane (VIEW 2) will be created in the working area to the right of the existing VIEW 1. The view originally contained in VIEW 1 remains assigned to that pane. The contents of the new view pane (VIEW 2) are

5   selected by the system user from a list 44 of open views in the view bar. Figure 6 shows the working area of the display as it would appear following the cursor emphasis of a particular view, VIEW 2, for the newly created pane.

10   Figure 6 shows the working area with VIEWS 1 and 2 being located in side-by-side relationship. In Figure 6, the view bar has returned to its hidden state. The hiding of the view bar can be made to occur automatically when the cursor is moved off the view bar area or, depending upon the objectives of the system implementers, may be made not to occur

15   until the user performs some sort of active deselection operation, such as clicking one of the buttons on the cursor control device. Note that Figure 6 shows that VIEW 2 is automatically selected as the focus pane because it is believed likely that the system user who set up the pane for VIEW 2 probably did so because of an immediate need to work with that

20   view. Making VIEW 1 the focus view can, if the user wants, be simply done by clicking on the title bar for that view.

While only two panes are shown in Figure 6, the user has the option of creating any number of additional views. For example, assuming VIEW 2

25   remains the focus pane, the user could opt to divide that pane into two smaller vertically-spaced panes by using the vertical pane splitting control and then selecting one of the open views in the viewbar list for the resulting unoccupied pane. The process can be repeated any number of times beginning with whichever pane has focus with obvious limitation

30   that, as panes become smaller, they can present less information to the user. The pane splitting controls make it easy for the user to establish any desired screen configuration. The view list visible in the view bar makes it easy for the user to assign a particular view to any unoccupied pane.

35

If a user, having created a tiled arrangement of views, decides that the arrangement isn't what he or she wanted, the present invention makes it simple for the user to rearrange the views without altering the pane configuration. Referring to Figure 7, VIEW 1 is assigned to a large pane

40   while VIEW 2 and VIEW 3 are each assigned to a smaller pane. If a user decides that VIEW 2 should be assigned to the larger pane, the views can be swapped using a click-drag-drop operation. The cursor is positioned

over one of the views to be swapped and one of the device buttons is
pressed and then held down as the cursor is moved to a position anywhere
in the other of the two panes to be swapped. The release of the device
button swaps the two views. Figure 8 shows the end result with VIEW 2 now
appearing in the larger pane with VIEW 1 appearing in the lower left pane
on the screen.

While the drawing shows the panes involved in the swap as being
contiguous, this is not a requirement of the invention. The two panes
involved in a swap may be completely separated from one another by one or
more intervening panes. The views that are swapped are determined solely
by the cursor position when the device button is first pressed and the
cursor position when the device button is subsequently released.

Referring back momentarily to Figure 4, the view bar is shown having
two additional controls 49 and 48 not previously discussed. As noted
earlier, the system may be implemented so that the view bar is hidden
(disappears) automatically if the user moves the cursor away from the view
bar area. Under some conditions, the user may not want the view bar to
disappear automatically. Control 49 is a "pin" control which, when
selected, will lock the view bar into its visible state regardless of the
current position of the cursor. Once the view bar has been locked into a
visible state, it cannot be hidden until some positive action is taken to
reset the pin control. Examples of suitable positive actions would be
clicking the pin control again and the like. Control 48 is a detach
control which, when activated, causes the selected view to be "torn off"
or removed from the current pane and launched into its own separate
detached window, which may be moved independently of the other tiled
panes.

Figure 9 is a flow chart of method steps that are performed during
the process of setting up a tiled screen configuration and assigning views
to each of the panes in that configuration. The initial step of 50 in the
process is the generation of the default display which consists of a
single view having focus and the thin strip of pels representing the
hidden view bar. After the default display is generated, the system
monitors the position of the cursor in step 52. Once the cursor is
detected as being above the hidden view bar, the view bar is revealed or
unhidden in step 54 and the system waits for one of the pane splitting
controls to be selected. Once step 56 detects that one of the pane
splitting controls has been selected, the video buffers for the display
are set up for two different panes occupying the space originally
allocated to the focus pane. Whether the new panes are oriented

side-by-side or above-and-below one another depends, of course, on which
of the pane splitting controls was selected.

In step 60 the data included in the view in the current focus pane
is assigned to one of two video buffers. Again, the assignment depends on
which of the pane splitting controls was selected in setting up the two
new panes. The system then enters a wait state, during which it monitors
the state and condition of the cursor to determine whether one of the open
views in the list of views appearing in the view bar has been selected.
Once selection of an open view is detected in step 62, the data for the
selected view is loaded, in step 64, into the second of the two newly
created panes. As noted earlier, it is entirely within the discretion of
the system user how many times to run this process in order to achieve a
tiled configuration of the display working area that he or she is
satisfied with.

Figure 10 is a flow chart of steps that are performed in carrying
out the previously-discussed view swapping operation. The initial step 70
of the process is to determine whether a particular key or button has been
depressed while the cursor is located above one of the existing panes.
Once the key or button depression is detected, the system then begins
monitoring the state of the cursor to determine whether the same key or
button is subsequently released after the cursor has moved to a position
above another of the existing panes. If a test 72 shows that the key has
been released over a second pane, the data representing the two affected
views is swapped between the first and second panes.

CLAIMS

1.   A method of managing the appearance of views on a display having a working area that includes at least one view pane, said method comprising the steps of:

   a) designating one of the view panes in the working area as a focus view pane;

   b) invoking a view bar including a set of pane splitting controls and a list of open views;

   c) in response to selection of one of the pane splitting controls, dividing the focus view pane into two panes, the contents of the focus view pane being assigned to a first of the two panes; and

   d) in response to selection of one of the open views from the list appearing in the view bar, assigning the selected view to a second of the two panes.

2.   A method as claimed in claim 1 wherein the view bar is normally hidden from view at one edge of the working area and wherein the step of invoking the view bar is responsive to moving a cursor into a position coincident with said edge of the working area.

3.   A method as claimed in claim 2 including the additional step of, in response to user input, pinning the view bar into a displayed state.

4.   A method as claimed in any preceding claim including the additional step of, in response to the user, selecting one of the view panes in the working area; and dragging the contents of the selected view pane to another of the view panes in the working area, swapping the contents of the selected view pane with said another view pane.

5.   A system for managing the representation of views comprising:

   a) a display having a working area including at least one view pane designated as a focus view pane;

   b) a display control subsystem for generating a view bar having pane splitting controls and a list of open views;

c) pane control logic responsive to selection of one of the pane splitting controls for dividing the focus view pane into two panes in accordance with the selected pane splitting control and for assigning the contents of the focus view pane to a first of the two panes; and

d) view control logic responsive to selection of one of the views on the list of open views for assigning the selected view to the second of the two panes.

6. A system as claimed in claim 5 wherein the view bar is normally hidden and said display control subsystem responds to the presence of a display cursor in a predetermined region of the display to unhide the view bar.

7. A system as claimed in claim 6 wherein the display control subsystem further includes logic for maintaining the appearance of the view bar.

8. A system as claimed in any of claims 5 to 7 wherein the display control subsystem further includes logic for altering the appearance of the working area, said logic including view swapping logic for swapping the contents of two selected view panes in the working area.

9. A computer program which, when executed on a computer, causes the computer to:

a) designate a view pane in a working area of a computer display as a focus view pane;

b) invoke a view bar on the computer display, said view bar including a set of pane splitting controls and a list of open views;

c) in response to selection of one of the pane splitting controls, divide the focus view pane into two panes, the contents of the focus view pane being assigned to a first of the two panes; and

d) in response to selection of an open view from the list appearing in the view bar, assign the selected view to a second of the two panes.

10. A computer program as claimed in claim 9 wherein the view bar is normally hidden from view at one edge of the working area and said program

product responds to the presence of a cursor in a predetermined area at said edge to unhide the view bar.

11.   A computer program as claimed in claim 10 wherein said program product responds to a user input to pin the view bar into its displayed state.

12.   A computer program as claimed in any of claims 9 to 11 which responds to selection of one of the view panes in the working area and dragging of the contents of the selected pane over another view pane to swap the contents of the two panes.
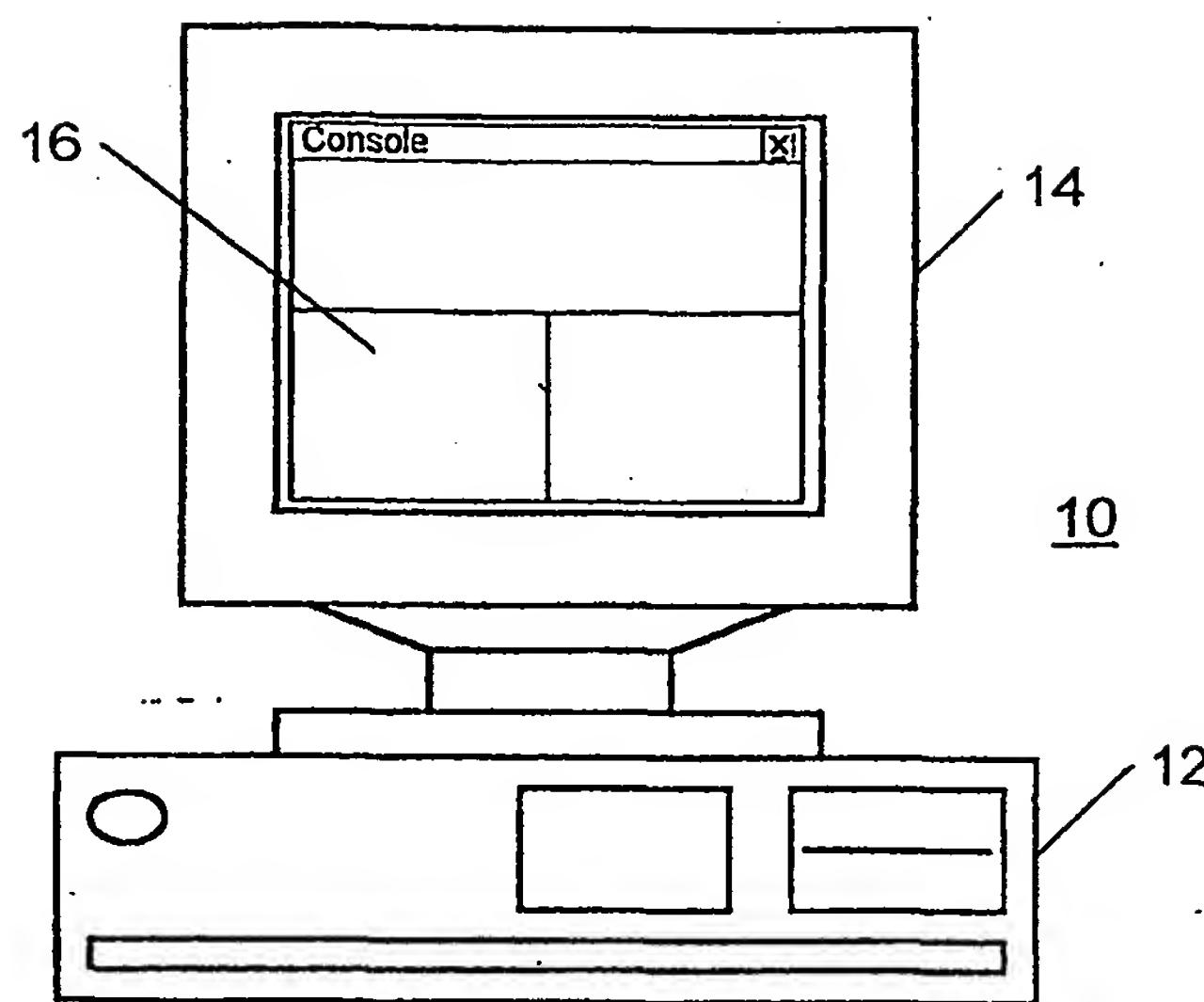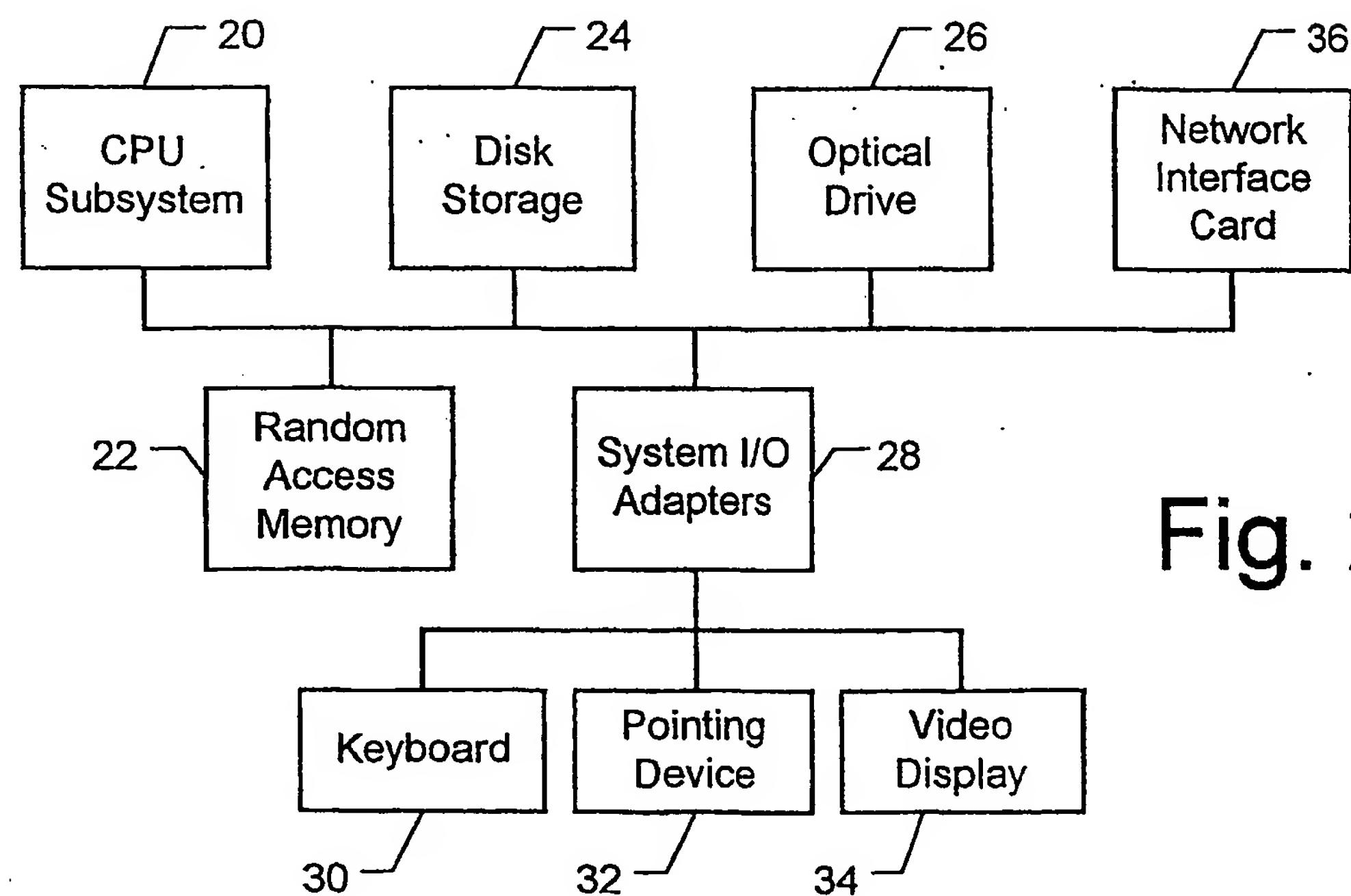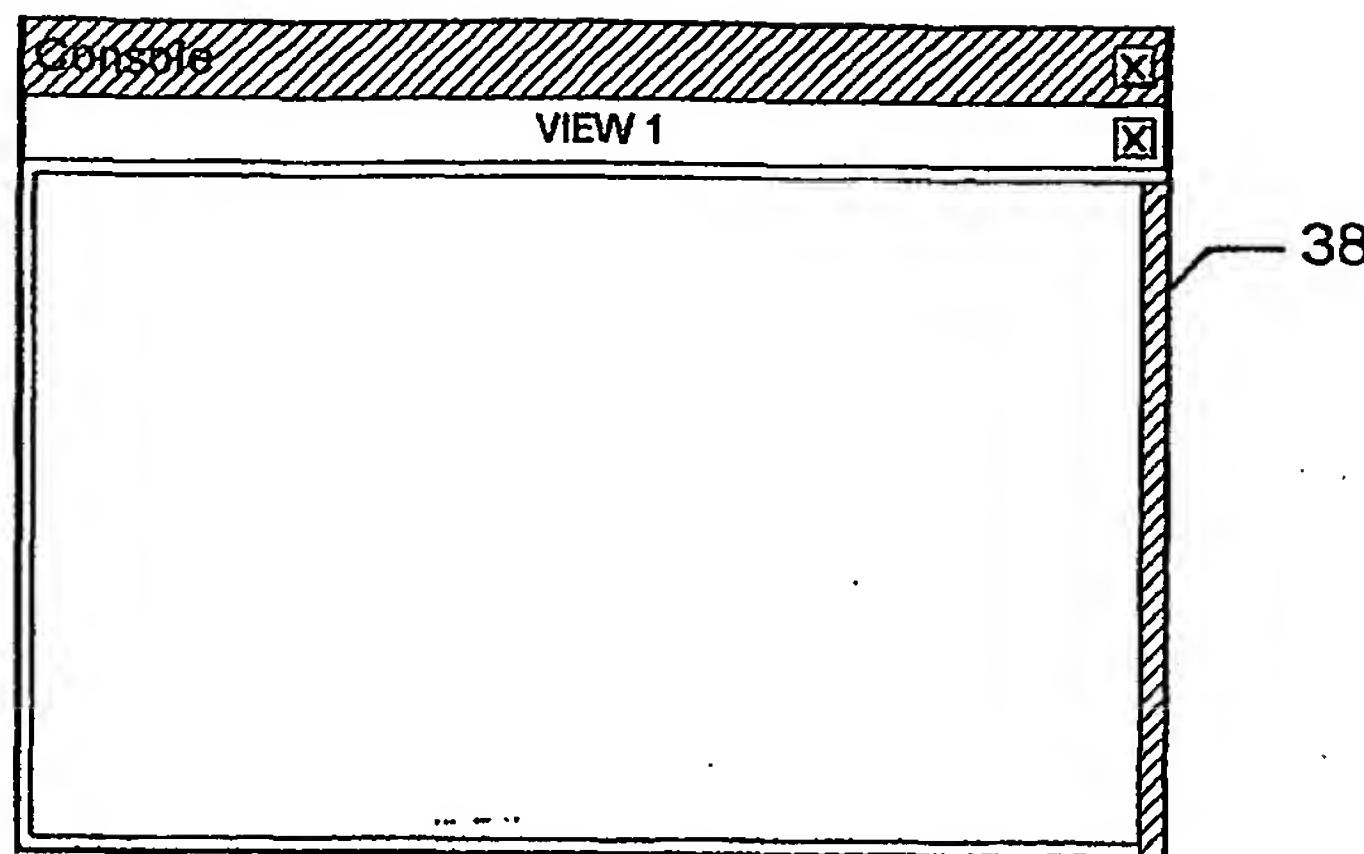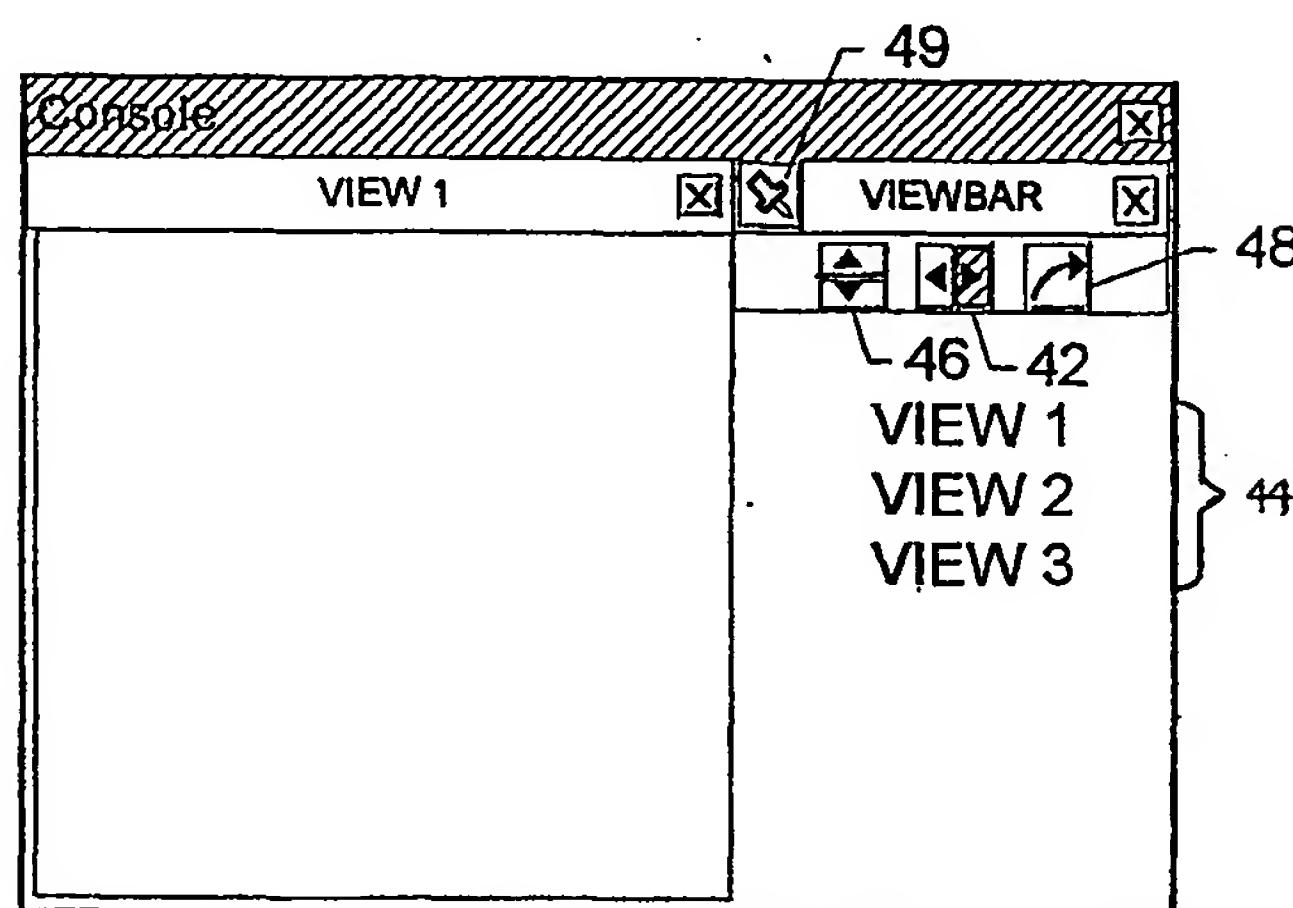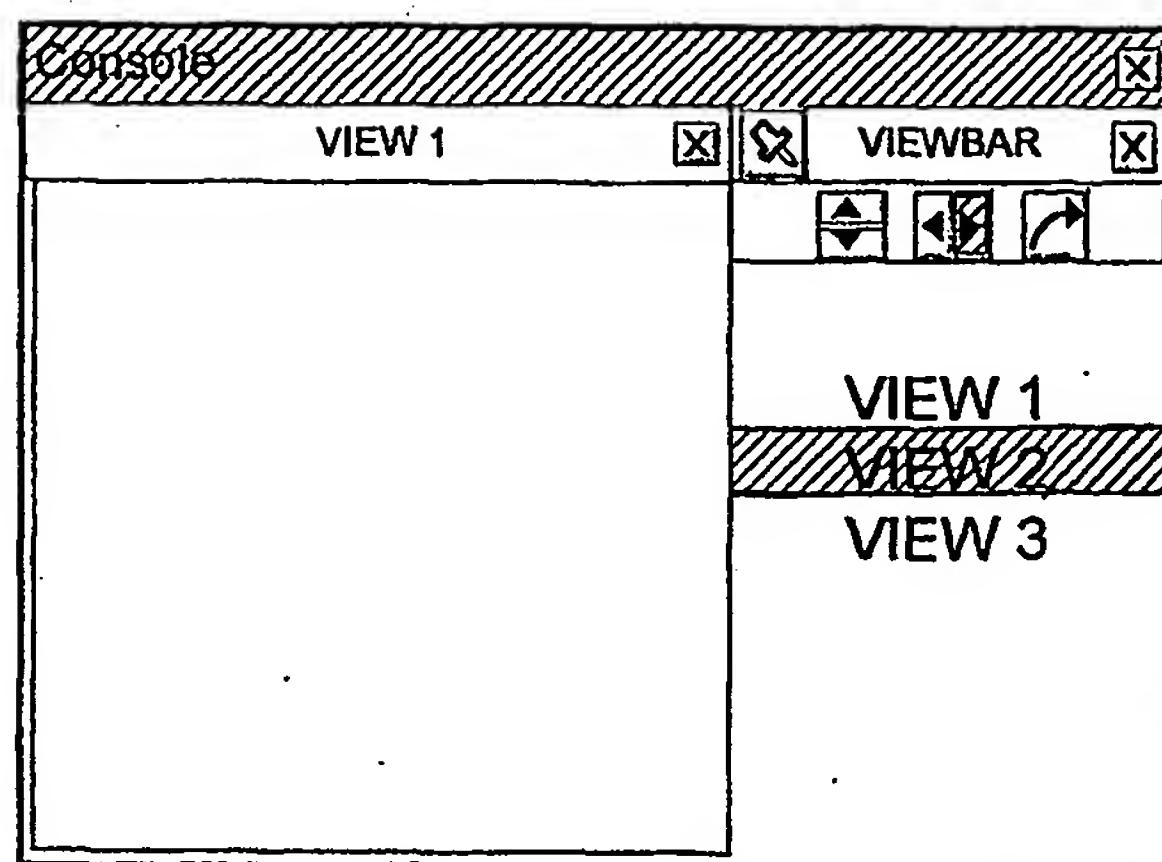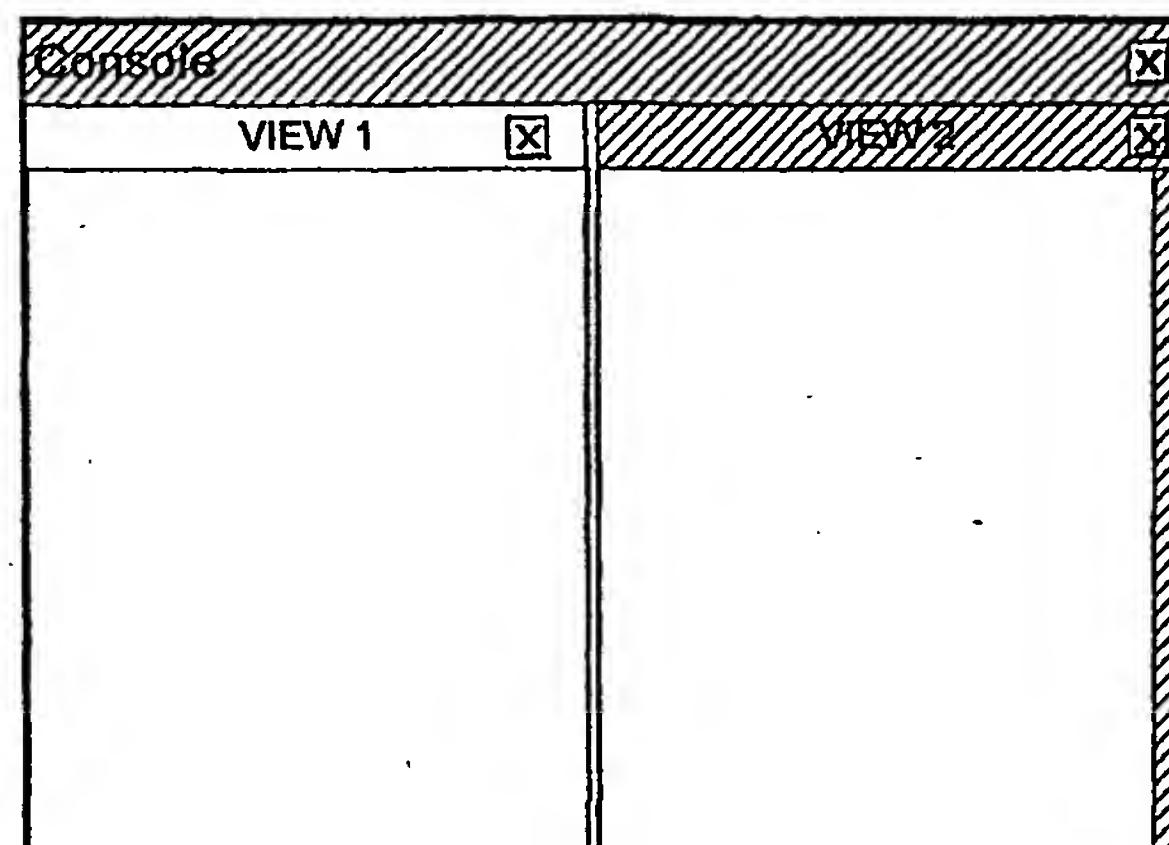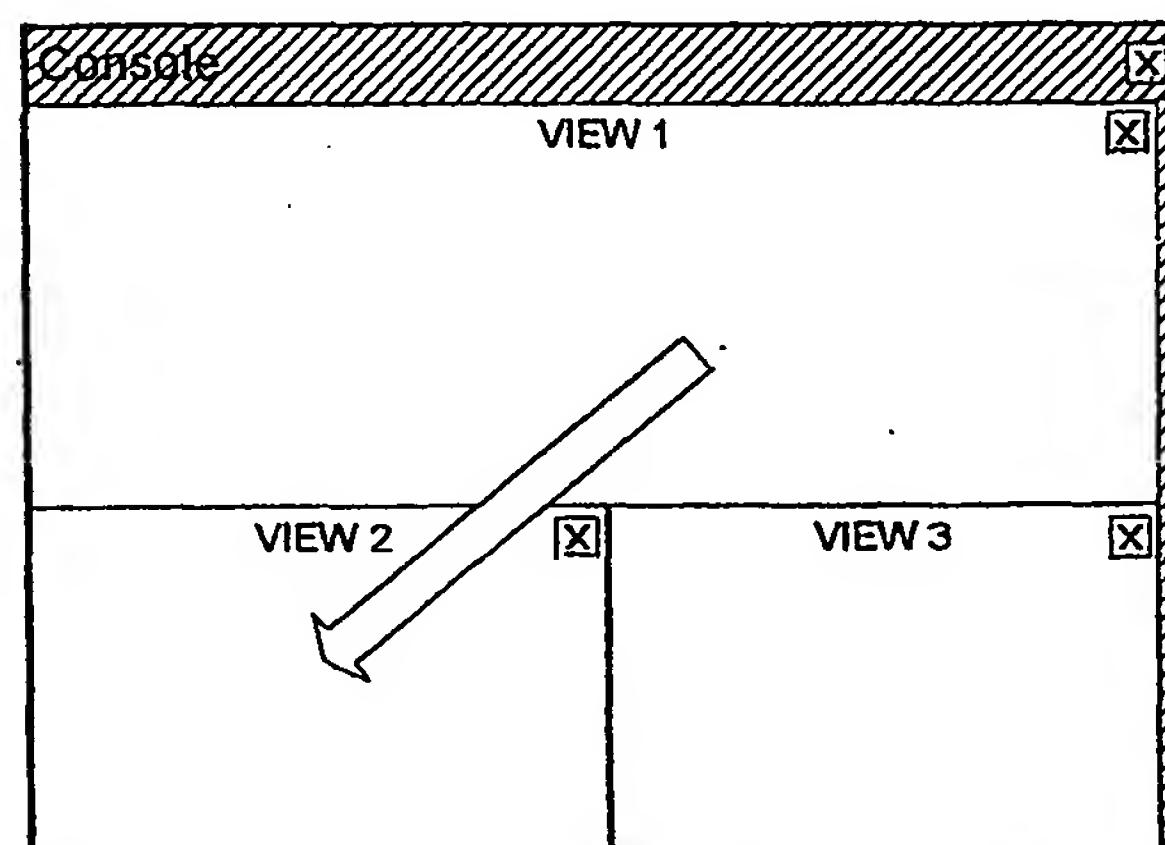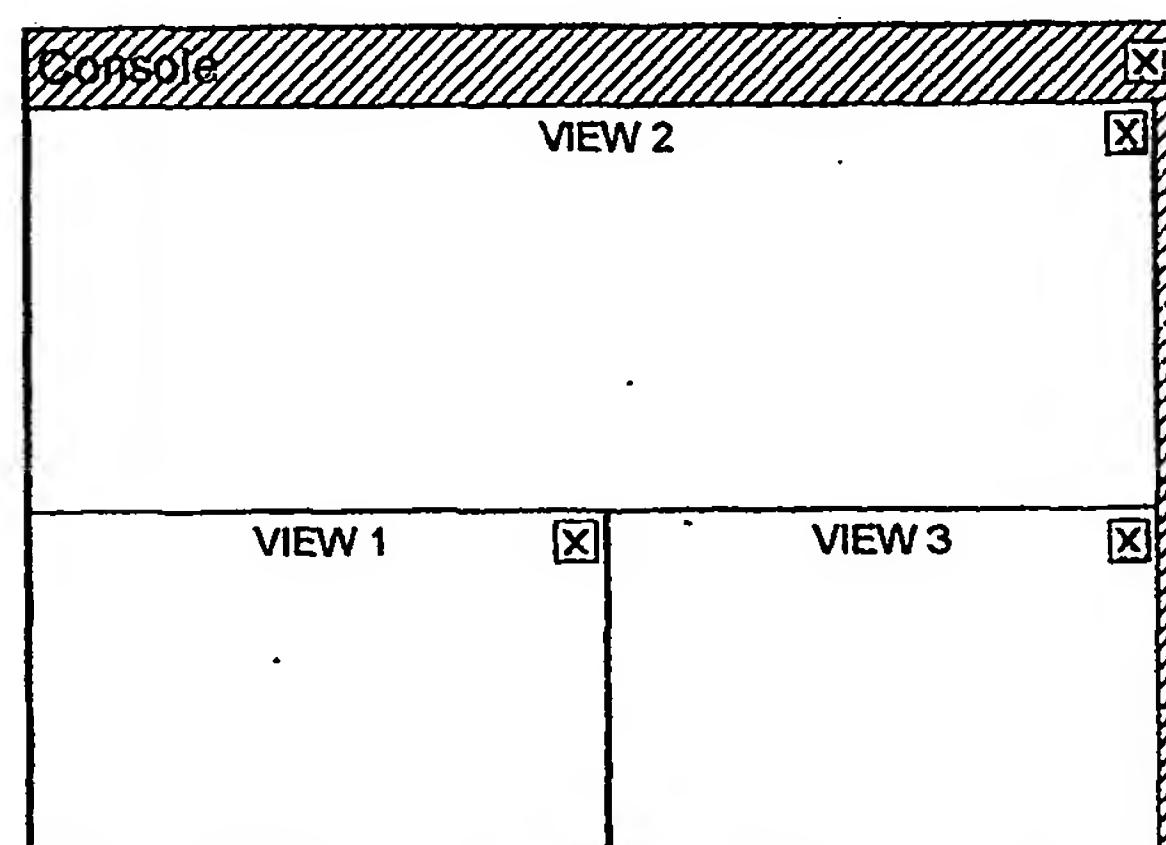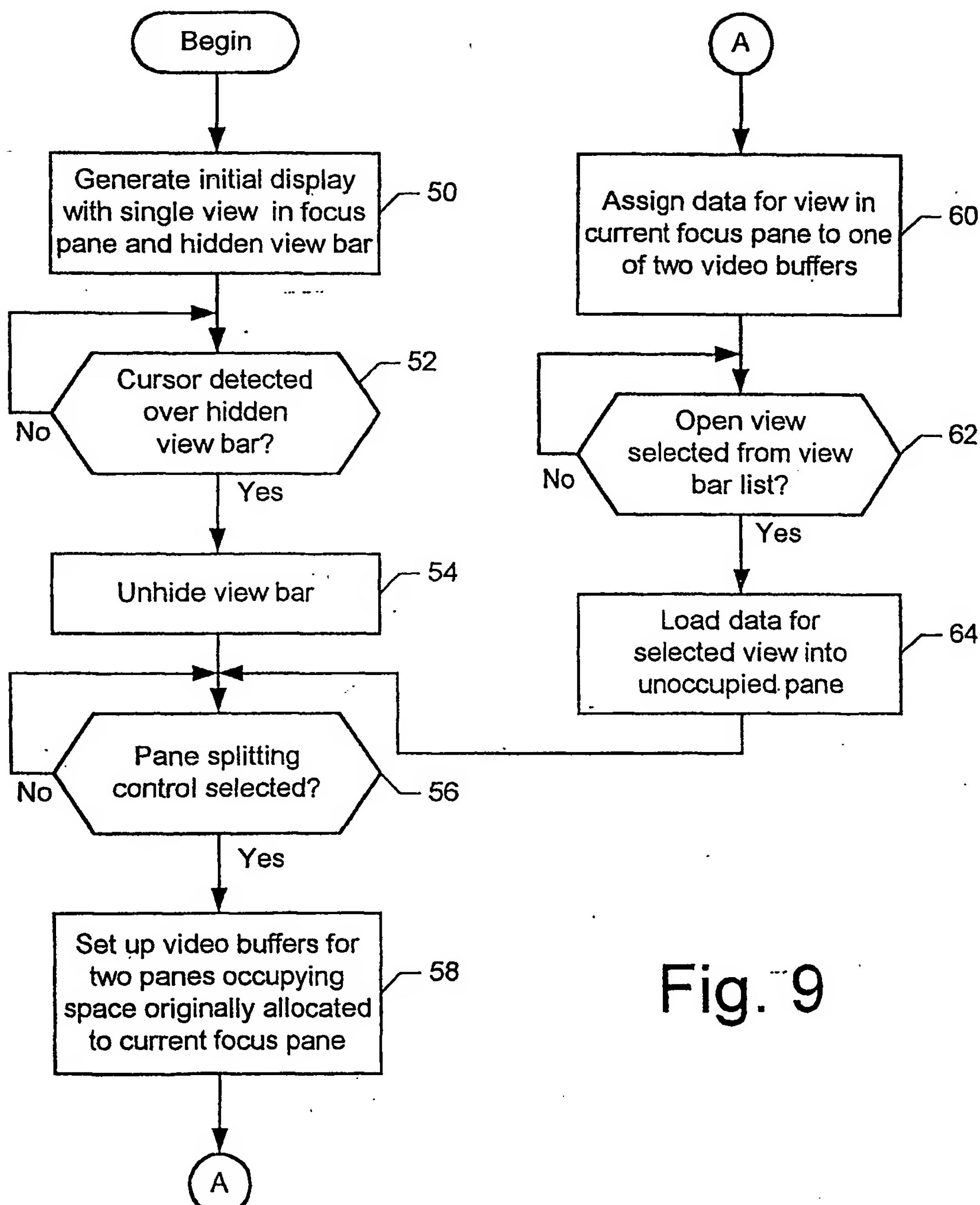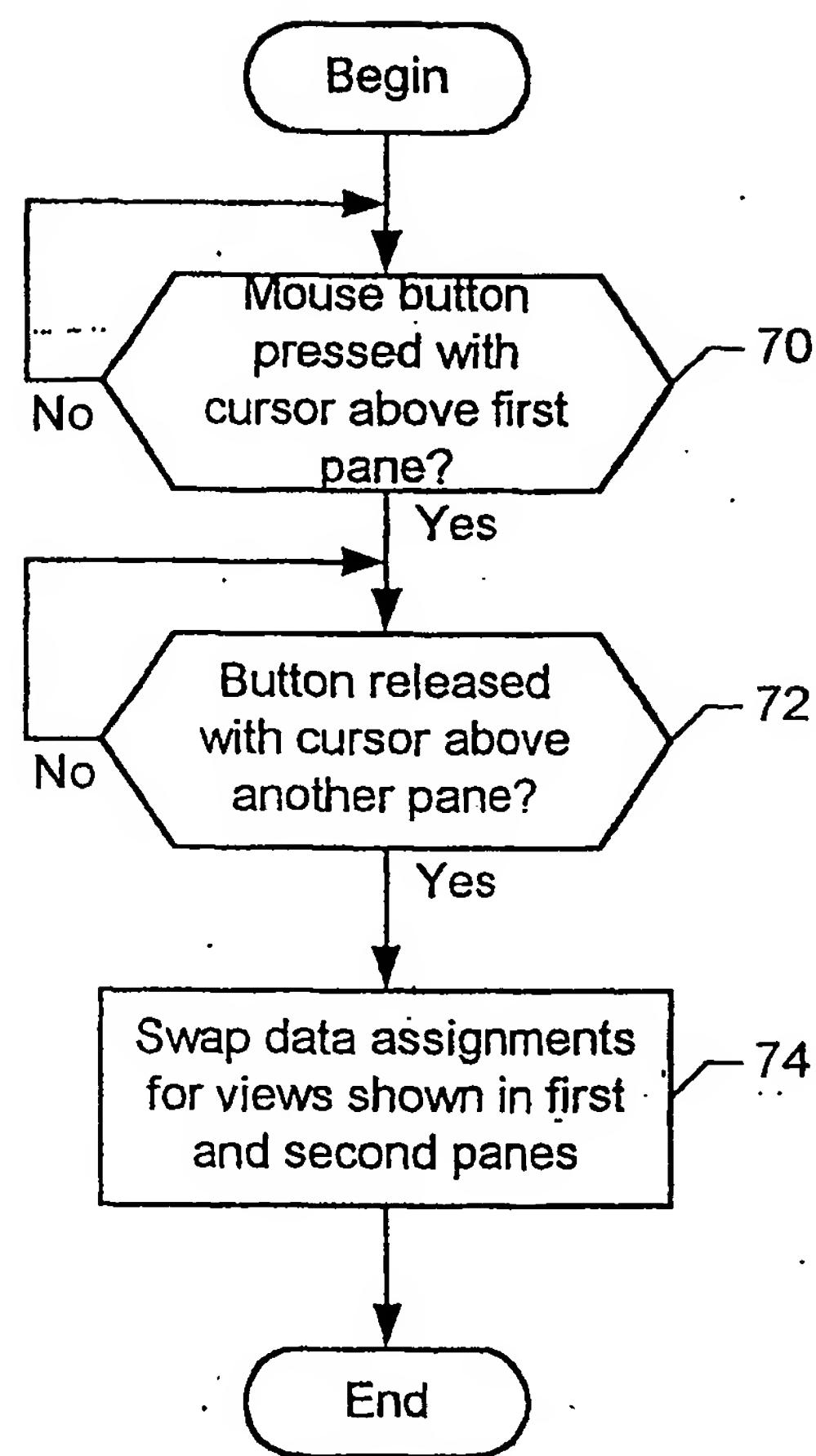
Console

16

14

10

Fig. 1

20
CPU Subsystem

24
Disk Storage

26
Optical Drive

36
Network Interface Card

22
Random Access Memory

28
System I/O Adapters

Fig. 2

Keyboard

Pointing Device

Video Display

30

32

34

Fig. 3

Console

VIEW 1

— 38

Fig. 4

49

Console

VIEW 1   VIEWBAR

— 48

46 42

VIEW 1
VIEW 2   } 44
VIEW 3

Fig. 5

Console

VIEW 1   VIEWBAR

VIEW 1
VIEW 2
VIEW 3

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 104 401 A (PARSONS PAIGE K) 15 August 2000 (2000-08-15) column 7, line 60 –column 8, line 30	1,5,9
A	WO 94 24657 A (APPLE COMPUTER) 27 October 1994 (1994-10-27) page 2, line 10 – line 15; claims; figures	1,5,9
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[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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